

XVI. IAPYX, a new Genus of Insects belonging to the Stirps Thysanura, in the Order Neuroptera. By A. H. HALIDAY, F.L.S.

(Plate XLIV.)

Read January 21st, 1864.

THE genus *Campodea**, first characterized by Mr. Westwood (in the Transactions of the Entomological Society of London, vol. iii. pp. 231–234, and pl. 8. figs. 14–23), and subsequently designated by M. Gervais (Suites à Buffon, Insectes Aptères, tom. iii. p. 455) as a link between the rest of the *Thysanura* and the Neuroptera which acquire wings and have caudal filaments (the *Perlidae* for instance), has been left in the family *Lepismidae* in, I believe, all modern systems of entomology which take notice of the genus at all, notwithstanding that it cannot hold such a position except by virtue of a considerable modification of the characters usually employed to define that family. The abnormal character of the genus is indicated by the varying place assigned to it by the few authors who appear to have observed the insect previous to the present century,—Linnaeus and, following him, Schrank having made of it a species of *Podura*, while Otho Müller has anticipated the conclusions of the moderns more accurately in referring it to the genus *Lepisma*. It may be, perhaps, no unfair inference to draw, that the insect in question is in some measure intermediate between both; and the recent discovery of an allied form induces me to propose the removal of the former, along with this, into a distinct family. The new insect referred to was first observed by me, under stones, in the neighbourhood of Lucca, when I was collecting the larvæ of *Embia* and *Termes*. Afterwards it occurred in other parts of Italy, and I communicated specimens to some of my entomological correspondents (under a name I have found cause to change here), supposing it to be entirely new, as it was so to them. Lately, however, in passing through Paris, having showed specimens to M. Lucas, he at once recognized it as an insect he had met with, years before, in Algeria. A drawing which he showed me left no doubt of the identity of the two. M. Lucas, however, had not thought fit to publish

* *Campodea ambulans*.

Pediculus terrestris, L. Fn. S. i. 1170.

Podura ambulans, L. Fn. S. ii. 1936 &c.; Schrank, Fn. B. iii. 184.

Lepisma minuta, Müller, Prodr. Zool. Dan.

Campodea staphylinus, Westwood, Trans. Ent. Soc. Lond. iii. 231–234; Gervais, Nicolet, &c.

? *Campodea succinea*, Nicolet, Ann. Soc. Ent. France, série ii. tom. v. p. 355.

Degeer first gave occasion to the oblivion into which the Linnean insect has fallen for so long, by misapplying the citation to his *Podura terrestris*, a *Lipura*. The description by Linnaeus generally, above all “the caudal setæ half as long as the body,” and the superior size of the insect negative this application, in which, however, as so often happens, Degeer has been followed implicitly by others. Schrank alone, so far as I know, has applied the synonym properly, and described the true Linnean insect. I have found it in Italy, up to the height of 7000 feet (top of Cimone), and perhaps higher still on the passes south of Monte Rosa.

it as a new genus, apprehending that it might prove to be the larval form of some undetermined insect. Although the first discovery of this interesting form—a link of some importance, perhaps, between certain families of Neuroptera—belongs to M. Lucas accordingly, that gentleman, with characteristic liberality, waived in my favour any claim he might have advanced to reserve the first publication of his discovery to himself, and furnished me with all the additional information he was in possession of as to its geographical diffusion. *Iapyx solifugus* has occurred at Paris, in the Garden of Plants; near Toulon; in Algeria; in various parts of Tuscany; in the neighbourhood of Naples, viz. at Sorrento, and within the precincts of the temples of Pæstum, the most southern point to which my search for it extended. In the Roman territory I found a couple of specimens at the base of the pile of stones which crowns the summit of Monte San Gennaro (“Lucretilis”), at an elevation considerably exceeding 5000 feet above the level of the sea. After this preliminary notice, I proceed to give the characters of the genus.

Class *Insecta*. Order *Neuroptera*. Stirps *Thysanura*.

Fam. LEPISMIDÆ (?).

Genus IAPYX*.

Antennæ in margine antico capitis approximatae, multiarticulatae, apice sensim attenuatae. Maxilla integra, acuta, falcata, intus pectinata, laciniis 4 tenuibus, membranaceis, falcatis, acutis, intus subtiliter ciliatis. Palpi labiales brevissimi, biarticulati. Prothorax segmentis duobus sequentibus minor. Abdominis segmenta anteriora mutica; penultimum brevissimum, subtus incompletum; ultimum maximum, oblongo-quadratum, apice appendicibus duabus porrectis, mobilibus, corneis, subfalcatis, intus denticulatis, forcipem prehensorium fingentibus. Pedes distantes, tarso exarticulato, oblongo, unguiculis 2 paribus, falcatis, acutis.

Affinitas summa cum genere *Campodea* Westwoodii.

Discrimina utriusque in schemate sequente exhibita sunt.

Genus CAMPODEA, *Westwood*.

Antennæ filiformes.

Maxilla radiis 5.

Palpi labiales nulli.

Abdominis segmenta anteriora subtus utrinque appendiculata; extremum præcedentibus non majus, apice appendiculis 2 setaceis multiarticulatis flexilibus divaricatis, abdominis circiter longitudine.

Genus IAPYX.

Antennæ apice sensim attenuatae.

Maxilla radiis 4.

Palpi labiales biarticulati.

Abdominis segmenta anteriora mutica; extremum maximum, apice appendiculis 2 exarticulatis, rigidis, falcatis, intus denticulatis, abdomine multo brevioribus, forcipem prehensorium fingentibus.

IAPYX SOLIFUGUS.

About 5 lines in length; ivory-white, semitransparent; the head, prothorax, and limbs paler; the terminal segments of the abdomen with the forceps chestnut; usually the dark contents of the ventricle produce the appearance of a broad longitudinal band down the back from the metathorax to the antepenultimate segment. The insect altogether

* 'Ιάπυξ, poetical name for *Calabrian*; applied here in allusion to the posterior appendages; as if it were Iäpyx, derived from the obsolete pronoun *is* for *αὐτός*, and *πυγή*, as *ιθαγενεῖς* for *αὐθιγενεῖς*.

much resembles some pale larva of a *Forficula*, but is more slender and more lithe, nearly linear, depressed, broadest behind the middle of the abdomen. The prorected head is oblong-quadrate, with the angles rounded off, larger than the thoracic segments singly; no vestige of eyes: the antennæ inserted close to the anterior margin or epistoma, approximate; longer than the head and thorax, gradually tapering to the end; of more than thirty joints; the first two more distinct, but scarcely longer than the rest, which are thickly pubescent, and verticillate with long hairs about the middle; the joints near the middle of the antennæ usually transverse, the preceding ones turbiniform. The mouth is situated in the anterior half of the head, on the under side, only the tips of the palpi (and of the maxillæ when these are opened) projecting a very little beyond the rounded entire margin of the epistoma. The parts of the mouth are formed nearly on the same type as in *Campodea*; the labrum transversely semielliptic, entire, membranaceous; the mandibles membranaceous, except at the tip, oblong, the tip slightly incurved and obliquely truncated, the truncature armed with four teeth. Maxillæ broad at the base, much attenuated beyond the middle, falcate, acute; the inner edge armed with four very slender, acute, falcated, membranaceous rays, which are very minutely ciliated along the concave edge. The labium, at the base connate with the maxillæ, is broad, and ends in four short lobes; the exterior ones, or paraglossæ, somewhat horny along the back, with the apex attenuate obtuse, and the inner margin sinuated; the intermediate lobes are again subdivided by a slight incision, each into two rounded divisions; a very slender membranous style, crowned with two hairs, sometimes projects between them,—the analogue probably of the hypopharynx.

The palpus, inserted at the back of the exterior lobe, and scarcely extending beyond the extremity of this, is two-jointed; the joints nearly equal in length, the second somewhat conical.

The prothorax is transverse, narrower than the head or the succeeding thoracic segments, and much shorter; these two are quadrate-orbicular, larger than the anterior abdominal segments, having below a broad pentagonal sternum. The legs are distant, with coxa, trochanter, femur, tibia, and tarsus distinct; the femur about as long as the tibia, but stouter; the latter unarmed at the tip; the tarsus shorter than it, oblong, bearing at the end two equal, falcate, acute unguiculi, much shorter than the tarsus; no distinct arolium. The fore pair of legs are the shortest, and arise close to the hind angles of the head; the hind pair the longest, yet not extending back beyond the middle of the abdomen. The abdomen is composed of ten segments (if we reckon the segment succeeding the metathorax, and complete with a ventral half-ring, the propodium, as belonging to the abdomen); it is broadest behind the middle, and the segments are of nearly equal length, except the last two; the penultimate one very short (often retracted entirely in dried specimens), and widely interrupted beneath, no ventral half-ring being visible, but only the inflected margins of the dorsal portion appearing as a lateral triangle; the last segment is much the largest, oblong-quadrate, almost truncated behind, but advancing a little in the middle in a very obtuse angle, which is notched on the upper side but entire below. The forceps, nearly as long as this segment, is composed of two equal arms, broad at the base, so as nearly to occupy, with their insertion, the

entire breadth of the segment, a very small interval only remaining between them. On the inner side, before the middle, they are armed with a few teeth, and thenceforth finely serrated—the attenuated and incurved tips crossing each other when the forceps is closed. The forceps, as well as the segment which bears it, is horny and rigid. The head, body, forceps, and limbs bear fine scattered hairs of different lengths, which appear simple under a lens. There is no trace apparent, on the under side of the abdomen, of such appendages as the genuine *Lepismidæ* in general possess, and which are not entirely obsolete in *Campodea*.

In younger individuals the antennæ are shorter and have fewer joints, and the forceps is proportionally smaller. Otherwise they resemble the adult insect. Even one which I found, not larger than a *Lipura fimetaria*, presented all the external characters of its kind. But it is very rare to find them less than two lines in length. The body being of much firmer consistence than that of *Campodea*, they burrow in the ground, or insinuate themselves into chinks even of solid ground, with extreme agility; and once out of sight, it is nearly hopeless to recover them by turning up the soil. They inhabit much the same localities as *Campodea*, under fallen leaves, or stones, or at the roots of trees, but are not quite so dependent on the degree of moisture. I presume their nutriment to be decaying vegetable matter or minute cryptogams; but from their aversion to light it was almost impossible to see the manner of their proceedings, although I kept a number of them alive for weeks together. I have observed the use they make of the forceps, just like *Forficulæ*, and the tactory function of the short labial palpi.

With regard to the internal structure, the softness of the parts opposes nearly the same difficulties as in the case of the *Poduridæ*, and my discoveries among them have been very little. The chief tract of the intestinal canal is occupied by a straight roomy cylindrical ventricle, without distinct proventriculus (or gizzard, as in the genuine *Lepismidæ*), or any Malpighian vessels; the œsophagus is much attenuated for some distance before its insertion into the ventricle; the small intestine is comparatively short, and is concealed by a conglomerate mass of acini, which, dividing into two arms, envelopes a number of moniliform ovithecæ of few (about five) cells, terminated by a short filament, which are implanted in the lower part of the two slender, somewhat varicose, deferent vessels, nearly as long as the ventricle, and lying at each side of it, and which end in a sort of small follicle, scarcely wider than the greatest diameter of the deferent, from which it is divided by a stricture. I have not found in any individual examined a distinction of the other sex. From this description it will be perceived that the intestinal characters agree with those of *Campodea* as closely as the structure of the oral organs and the external form in general, with the striking exception of the forceps so exactly resembling the analogous organ in the stirps *Labidura* that it is difficult not to recognize in it an indication of natural affinity, which would considerably dislocate the usual arrangement of the groups of Neuroptera with non-quiet pupa—the Orthoptera of authors. Yet the essential characters of the *Labidura* are in many respects so remote from those of the genus *Iapyx*, that I should deliberate long before attributing to that similarity more than a secondary significance. On the other hand, with the reservation of the few differences scheduled in the comparative diagnosis of *Iapyx* and *Campodea*, these two

genera, as I have said, agree so essentially in general form, and structure of oral and intestinal organs, that it seems inevitable they should be referred to one family; while *Iapyx*, at least, differs so much in nearly every one of these particulars from the typical *Lepismidæ*, that the constitution of a distinct family to receive these two genera suggests itself as a ready alternative. It remains to be inquired whether there be not some such intermediate links extant as may efface the discrepancy apparent at first sight, and forbid the division. If anywhere, such a link is to be looked for in the genus *Nicoletia* of Gervais*, as to which, unfortunately, our information remains absolutely *nil* as regards intestinal structure. The *galeate* maxillæ, well-developed palpi, and triplicate appendages of the caudal extremity vindicate for this insect a place in the family *Lepismidæ*, notwithstanding that in its general appearance—bleached and scaleless—it so much resembles *Campodea*. The pectinate inner lobe of the maxilla of *Nicoletia* and the ventral appendages of *Campodea* seem to bring them somewhat closer; and the different number of the caudal filaments may perhaps not deserve so much weight as has been commonly attributed to that character within the limits of this stirps, when we remember how the number varies between two and three among the *Ephemeridæ*, a group not very distant, perhaps, from the *Thysanura*. The differences, therefore, which incline me to propose the introduction of a new family, intermediate in position between the *Lepismidæ* and *Poduridæ*, are so much more pronounced in *Iapyx*, that I must consider it as the type, and instead of deriving the family name from the genus longest known, *Campodea*, I propose to take it from the typical one, *Iapyx*. Accordingly the family

IAPYRIDÆ,

in the stirps *Thysanura*, is distinguished from the two other families between which I have placed it by the characters exhibited, antithetically, in the columns of the Table following:—

Fam. LEPISMIDÆ.	Fam. IAPYRIDÆ.	Fam. PODURIDÆ.
Antennæ multiarticulatæ.	Antennæ multiarticulatæ.	Antennæ pauciarticulatæ; vel paucis tantum, versus basin, discretis; extremis coarctatis.
Maxilla biloba, mala exteriore subarticulata, galeiformi.	Maxilla integra, falcata, acuta, intus pectinata.	Maxilla oblonga, apice fissa et denticulata.
Palpi quatuor; maxillares maxilla longiores.	Palpi brevissimi; alteruter, aut uterque, obsoletus.	Palpi (exarticulati; vel potius) obsoleti.
Prothorax magnus.	Prothorax minimus.	Prothorax minimus.
Tarsus pluriarticulatus.	Tarsus exarticulatus, oblongus.	Tarsus brevissimus, aut cum tibia connatus.
Unguiculi bini pares.	Unguiculi bini pares.	Unguiculus unicus (vel bini impares).

* *Nicoletia terrestris*, L.

Lepisma terrestris, L. Fn. S. ii. 1926; S. N. xii. ii. 1012.

Nicoletia geophila, Gervais, Ann. Soc. Ent. Fr. 1^{re} série, tome xi. p. 48, &c.

? — *phytophila*, *ibid.*

Fam. LEPISMIDÆ.	Fam. IAPYRIDÆ.	Fam. PODURIDÆ.
Abdomen segmentis 10 (computato propodio).	Abdomen segmentis 10 (computato propodio).	Abdomen segmentis ad summum septem; propodii tubo infero medio exserto.
Segmenta anteriora abdominis utrinque appendiculata (nonnulla saltem).	(Segmenta abdominis anteriora appendiculata vel mutica.)	Segmenta abdominis anteriora (propodio dempto) mutica.
Segmentum extremum appendicibus porrectis pluriarticulatis, ternis (vel pluribus numero impari).	Segmentum extremum appendicibus porrectis binis tantum (diversimodo formatis).	Segmentum extremum appendice inflexa laciniis binis setaceis terminata (<i>furca saltatoria</i>); vel his brevissimis conicis retrorsum versis.
Vasa Malpighiana 4.	Vasa Malpighiana nulla.	Vasa Malpighiana nulla*.
Proventriculus triturationi aptus.	Proventriculus obsoletus.	Proventriculus obsoletus.

DESCRIPTION OF THE PLATE.

PLATE XLIV.

Iapyx solifugus.

- A. Natural length of a mature specimen.
- B. Magnified figure of one, from above.
- C. Last three segments, from beneath.
- D. One arm of forceps.
- E. Anterior outline of head from beneath, with the palpi (labial) in position.
- F. First joint of both antennæ with their insertion.
- G. Base of antennæ, first five joints.
- H. An intermediate joint.
- I. Terminal three joints.
- K. Three intermediate joints, from a young specimen.
- L. Fore leg.
- M. Under side of mesothorax (sternum, *k*), with one leg complete.
- N. Middle leg.
- O. A claw.
1. The mouth, from beneath, with the maxillæ open.
2. Anterior portion of labium, more magnified: *p*, palpus; *q*, exterior lobe, or paraglossa; *m*, *n*, divisions of one of the intermediate lobes; *t*, hypopharynx?
3. Paraglossa, and an intermediate lobe, alone.
4. The same, with palpus in position.
- 5, 6, 7. Mandible, seen in different aspects.

* Six, according to Burmeister and Nicolet; but I have failed to find them. Still I should have followed their authority here without doubting, but that Mr. Lubbock's minute and careful investigations have not succeeded in bringing these organs to light (see Trans. Linn. Soc. vol. xxiii. p. 441).

8. Extremity of same, four-toothed.
- 9, 10. Maxillæ.
11. Intestinal canal and reproductive system of female: *a*, head; *b*, œsophagus; *c*, attenuated portion of same; *d*, ventricle; *e*, follicle and deferent; *f*, cluster of egg-sheaths enveloped in a granular mass.
12. Follicle and deferent, with the insertion of an egg-sheath in the lower part of the latter.
13. Fragments of ovithecæ.
14. Fragment of an organ connected with ovaries.
15. Two intermediate ganglia of the rachidian chain; with the internode, a double chord, longer than a ganglion.

Campodea ambulans, L.

- A. Intestinal canal.
- B. Follicle and deferent.

The following are rough copies of Mr. Westwood's figures:—

1. Labrum.
2. Mandible.
- 3, 4. Maxillæ.
5. Paraglossa (probably).
6. Terminal joints of antenna.
7. Tarsus with unguiculi.